

(9) Flame retardant, if added during manufacturing: type, supplier, the supplier's stock number, and percent of finished product by weight.

[53 FR 23500, June 22, 1988, as amended at 60 FR 33722, June 29, 1995]

§ 7.24 Technical requirements.

(a) Brattice cloth shall be flame resistant when tested in accordance with the flame resistance test in § 7.27.

(b) Flexible ventilation tubing shall be manufactured using an MSHA-approved brattice cloth. If a supporting structure is used, it shall be metal or other noncombustible material which will not ignite, burn, support combustion or release flammable vapors when subjected to fire or heat.

(c) Rigid ventilation tubing shall be flame resistant when tested in accordance with the flame resistance test in § 7.28.

§ 7.25 Critical characteristics.

A sample of each batch or lot of brattice cloth and ventilation tubing shall be flame tested or a sample of each batch or lot of the materials that contribute to the flame-resistance characteristic shall be inspected or tested to ensure that the finished product will meet the flame-resistance test.

§ 7.26 Flame test apparatus.

The principal parts of the apparatus used to test for flame-resistance of brattice cloth and ventilation tubing shall be constructed as follows:

(a) A 16-gauge stainless steel gallery lined on the top, bottom and both sides with ½ inch thick Marinite or equivalent insulating material yielding inside dimensions approximately 58 inches long, 41 inches high, and 30 inches wide;

(b) Two ⅜-inch diameter steel J hooks and a ⅝-inch diameter steel rod to support the sample located approximately 2⅜-inches from the front and back ends of the test gallery, 1½-inches from the ceiling insulation and centrally located in the gallery along its length. Samples shall be suspended to preclude folds or wrinkles;

(c) A tapered 16-gauge stainless steel duct section tapering from a cross sectional area measuring 2 feet 7 inches wide by 3 feet 6 inches high at the test gallery to a cross-sectional area 1 foot

6 inches square over a length of 3 feet. The tapered duct section must be tightly connected to the test gallery;

(d) A 16-gauge stainless steel fan housing, consisting of a 1 foot 6 inches square section 6 inches long followed by a 10 inch long section which tapers from 1 foot 16 inches square to 12 inches diameter round and concluding with a 12 inch diameter round collar 3 inches long. A variable speed fan capable of producing an air velocity of 125 ft./min. in the test gallery must be secured in the fan housing. The fan housing must be tightly connected to the tapered duct section;

(e) A methane-fueled impinged jet burner igniting source, measuring 12 inches long from the threaded ends of the first and last jets and 4 inches wide with 12 impinged jets, approximately 1⅝-inches long and spaced alternately along the length of the burner tube. The burner jets must be canted so that they point toward each other in pairs and the flame from these pairs impinge upon each other.

§ 7.27 Test for flame resistance of brattice cloth.

(a) *Test procedures.* (1) Prepare 6 samples of brattice cloth 40 inches wide by 48 inches long.

(2) Prior to testing, condition each sample for a minimum of 24 hours at a temperature of 70 ±10 °F (21 ±5.5 °C) and a relative humidity of 55 ±10%.

(3) For each test, suspend the sample in the gallery by wrapping the brattice cloth around the rod and clamping each end and the center. The brattice cloth must hang 4 inches from the gallery floor.

(4) Use a front exhaust system to remove smoke escaping from the gallery. The exhaust system must remain on during all testing, but not affect the air flow in the gallery.

(5) Set the methane-fueled impinged jet burner to yield a flame height of 12 inches as measured at the outermost tip of the flame.

(6) Apply the burner to the front lower edge of the brattice cloth and keep it in contact with the material for 25 seconds or until 1 foot of material, measured horizontally, is consumed, whichever occurs first. If the material

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shrinks during application of the burner flame, move the burner flame to maintain contact with 1 foot of the material. If melting material might clog the burner orifices, rotate the burner slightly during application of the flame.

(7) Test 3 samples in still air and 3 samples with an average of 125 ft./min. of air flowing past the sample.

(8) Record the propagation length and duration of burning for each of the 6 samples. The duration of burning is the total burning time of the specimen during the flame test. This includes the burn time of any material that falls on the floor of the test gallery during the igniting period. However, the suspended specimen is considered burning only after the burner is removed. Should the burning time of a suspended specimen and a specimen on the floor coincide, count the coinciding burning time only once.

(9) Calculate the average duration of burning for the first 3 samples (still air) and the second 3 samples (125 ft./min. air flow).

(b) *Acceptable performance.* The brattice cloth shall meet each of the following criteria:

(1) Flame propagation of less than 4 feet in each of the six tests.

(2) An average duration of burning of less than 1 minute in both groups of three tests.

(3) A duration of burning not exceeding two minutes in each of the six tests.

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§ 7.28 Test for flame resistance of rigid ventilation tubing.

(a) *Test procedures.* (1) Prepare 6 samples of ventilation tubing 48 inches in length with all flared or thickened ends removed. Any sample with a cross-sectional dimension greater than 24 inches must be tested in a 24-inch size.

(2) For each test, suspend the sample in the center of the gallery by running a wire through the 48-inch length of tubing.

(3) Use a front exhaust system to remove smoke escaping from the gallery. The exhaust system must remain on during all testing but not affect the air flow in the gallery.

(4) Set the methane-fueled impinged jet burner to yield a flame height of 12 inches as measured at the outermost tip of the flame.

(5) Apply the burner to the front lower edge of the tubing so that two-thirds of the burner is under the tubing and the remaining third is exposed to allow the flames to curl onto the inside of the tubing. Keep the burner in contact with the material for 60 seconds. If melting material might clog the burner orifices, rotate the burner slightly during application of the flame.

(6) Test 3 samples in still air and 3 samples with an average of 125 ft./min. of air flowing past the sample.

(7) Record the propagation length and duration of burning for each of the 6 samples. The duration of burn is the total burning time of the specimen during the flame test. This includes the burning time of any material that falls on the floor of the test gallery during the igniting period. However, the suspended specimen is considered burning only after the burner is removed. Should the burning time of a suspended specimen and a specimen on the floor coincide, count the coinciding burn time only once.

(8) Calculate the average duration of burning for the first 3 samples (still air) and the second 3 samples (125 ft./min. air flow).

(b) *Acceptable performance.* The ventilation tubing shall meet each of the following criteria:

(1) Flame propagation of less than 4 feet in each of the 6 tests.

(2) An average duration of burning of less than 1 minute in both groups of 3 tests.

(3) A duration of burning not exceeding 2 minutes in each of the 6 tests.

[53 FR 23500, June 22, 1988, as amended at 60 FR 33723, June 29, 1995]

§ 7.29 Approval marking.

(a) Approved brattice cloth shall be legibly and permanently marked with the assigned MSHA approval number at intervals not exceeding ten feet. If the nature of the material or method of processing makes such marking impractical, permanent paint or ink may be used to mark the edge with an MSHA-assigned color code.